

Regional Supervisor,
Division of Wildlife Refuges

February 4, 1966

Regional Engineer

EM-R Tawaukon
Water Mgmt. Plan

Tawaukon NWR, North Dakota - 1966 Proposed Annual Water Program

We have reviewed the subject program and concur in the proposed operation for 1966.

We were pleased to receive the outflow summary for 1965 attached with the annual operating plan. This data will prove valuable in the years ahead and should be continued. We averaged the figures submitted by the refuge manager and arrived at the following totals for Tawaukon outflow in comparison with observed flow data near Rutland and Cayuga, North Dakota:

Outflow by Month (in acre-feet)

Location	April	May	June	July	August	Sept.	Total
Rutland	3862	1010	896	684	42	0	6,494
Tawaukon Control	8278	3008	2586	2518	--	-	16,390
Cayuga	9414	2794	2768	1764	338	32	17,110

We suggest that the refuge manager go one step further now and compute the inflow to the refuge using the method presented on hand-out material at the Regional Conference. This data will then provide us with a relatively complete record of water use data to support our water rights at the refuge. We believe it will also prove beneficial in year-to-year planning of operational objectives. We have already received one inquiry from the State Engineer for water use data at Tawaukon Refuge this year. This request will probably be repeated for Bureau installations and we need the assistance and cooperation of all field personnel to meet these requests. We wish to commend the Tawaukon Refuge Manager on his willingness to try our previous suggestions in this regard.

As the construction phase at Outler Marsh structure draws near, we may find it desirable to lower Tawaukon Pool lower than the proposed 1147 level. This additional drawdown could facilitate construction if the 1966 runoff is of short duration.

John D. Umberger

extra cc attd.
CWStephan:rj 2/4/66

Stephan
2-4-66
Doering
2-8-66

Stevenson
2/8/66

Wright
2-8-66
Umberger
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ANNUAL WATER PROGRAM - TEWAUKON DAM

I. 1965 Water Use Data.

IMPOUNDMENT DATA

Lake Tewauckon for Calendar Year 1965
(spillway elevation 1147)

Month	Gauge Reading (average)	Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.	6.50 *	1146.50	1,050	6,300
Feb.	6.65 *	1146.65	1,055	6,550
Mar.	6.75	1146.75	1,058	6,750
Apr.	8.31	1148.31	1,205	8,600
May	7.76	1147.76	1,153	7,760
June	7.68	1147.68	1,145	7,650
July	7.64	1147.64	1,140	7,600
Aug.	7.27	1147.27	1,101	7,100
Sept.	7.02	1147.02	1,081	6,820
Oct.	6.91	1146.91	1,070	6,750
Nov.	6.64	1146.64	1,055	6,550
Dec.	6.60	1146.60	1,053	6,475

Cutler Marsh for Calendar Year 1965
(spillway elevation 1149)

Month	Gauge Reading (average)	Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.	8.75 *	1148.75	171	420
Feb.	8.90 *	1148.90	186	430
Mar.	9.04	1149.04	197	442
Apr.	10.61	1150.61	250	750
May	9.71	1149.71	235	572
June	9.57	1149.57	229	525
July	8.99	1148.99	193	436
Aug.	7.34	1147.34	147	200
Sept.	7.03	1147.03	140	160
Oct.	6.97	1146.97	135	150
Nov.	6.74	1146.74	120	135
Dec.	6.60	1146.60	115	125

White Lake for Calendar Year 1965 (1)
(spillway elevation 1149)

Month	Gauge Reading (average)	Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.	8.50 *	1148.50	204	453
Feb.	8.60 *	1148.60	211	463
Mar.	8.65 *	1148.65	214	468
Apr.	10.27	1150.27	350	690
May	9.64	1149.64	311	572
June	9.67	1149.67	316	575
July	9.45	1149.45	300	552
Aug.	8.74	1148.74	220	478
Sept.	8.46	1148.46	201	450
Oct.	8.38	1148.38	195	443
Nov.	8.19	1148.19	187	435
Dec.	8.16	1148.16	185	430

+ Inlet reading * Estimated

(1) Presently controlled by Cutler Marsh structure

No Corcoran Marsh Structure

Clouds Lake for Calendar Year 1965
(spillway elevation 1179)

Month	Gauge Reading (average)	Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.	5.00 *	1175.00	109	485
Feb.	4.90 *	1174.90	108	472
Mar.	4.80 *	1174.80	106	461
Apr.	6.06	1178.06	110	710
May	7.92	1177.92	139	705
June	7.72	1177.72	138	677
July	7.55	1177.55	136	654
Aug.	7.29	1177.29	133	617
Sept.	6.84	1176.84	128	553
Oct.	6.28	1176.28	123	502
Nov.	5.05	1175.05	110	485
Dec.	4.79	1174.79	106	460

Sprague Lake for Calendar Year 1965
(spillway elevation 1212) *

Month	Gauge Reading (average) *	Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.	2.35 *	1207.99	159	470
Feb.	2.50 *	1208.14	161	490
Mar.	2.60	1208.24	162	510
Apr.	6.41	1212.05	179	1060
May	6.32	1212.32	181	1095
June	5.90	1211.90	178	1035
July	5.63	1211.63	176	995
Aug.	5.28	1211.28	174	945
Sept.	5.05	1211.05	172	925
Oct.	4.99	1210.99	171	905
Nov.	4.83	1210.83	170	900
Dec.	4.80	1210.80	169	897

Mann Lake for Calendar Year 1965

Month	Gauge Reading (average)	Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.	8.50 *	1208.50	46	179
Feb.	8.55 *	1208.55	46	182
Mar.	8.75 *	1208.75	47	191
Apr.	12.00	1212.00	56	425
May	10.84	1210.84	54	360
June	9.91	1209.91	52	250
July	9.63	1209.63	51	232
Aug.	8.90	1208.90	47	197
Sept.	8.59	1208.59	46	183
Oct.	8.52	1208.52	46	180
Nov.	8.40	1208.40	44	170
Dec.	8.44	1208.44	44	174

* Estimated

+ Jan., Feb., March, April 0.0 on gauge 1205.64 the remaining months are 1206.00

SMALL IMPOUNDMENTS
(Clouds Lake drainage)

Pool #3a for Calendar Year 1965 (1)

Month	Average Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.-Sept.	Not in operation		
Oct.	1154.00	7	12
Nov.-Dec.	dry		

Pool #5 for Calendar Year 1965 (2)

Month	Average Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.-Mar.	1162.90 *	14	63
Apr.	1162.50 *	13	52
May	1161.25 *	11	43
June	1160.73	10	35
July	1162.48	13	52
Aug.	1161.95	12	48
Sept.	1162.73	14	57
Oct.	1162.48	13	52
Nov.	dry		
Dec.	dry		

Pool #6 for Calendar Year 1965 (3)

Month	Average Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.-Mar.	1164.50 *	4	6
Apr.	1166.75 *	7	20
May	1166.95 *	8	23
June	1166.70	6	18
July	1166.57	6	15
Aug.	1165.47	5	10
Sept.	1167.20	8	29
Oct.	1166.82	7	20
Nov.	dry		
Dec.	dry		

Pool #7 for Calendar Year 1965 (4)

Month	Average Elevation (feet)	Area (acres)	Capacity (acre-feet)
Jan.-Sept.	1176.28	20	70
Nov.	1174.70	20	30
Dec.	1174.70	20	30

* Estimated

- (1) Filled by water released from Clouds Lake 10/6 - 10/8
 (2) Maintained by periodic water releases from Clouds Lake
 (3) Maintained by periodic water releases from Clouds Lake
 (4) Filled by water released from Clouds Lake 10/16

Summary of 1965 Water Program

General.

A heavy spring runoff plus above normal precipitation resulted in the fourth straight year of excellent water conditions. Water levels were at or very near spillway level throughout the year with the exception of the pools in planned drawdown.

The extremely cold winter resulted in exceptionally thick ice being formed on all water areas. By the end of January the ice on Lake Tawaukon was over three feet thick. The ice became somewhat thinner (30") during February and still measured thirty inches at the end of March. Break-up, due to the extreme thickness of the ice, was about three weeks later than normal with White Lake the last to open on April 22.

Freeze-up did not begin until the second week of November and then only on the small potholes. The larger lakes did not completely freeze over until the final week of November. Large areas of water reappeared with the mild weather of the first two weeks of December, with the open water areas finally freezing during the third week of December.

Mild temperatures during the first week of April initiated the spring runoff. Supplemented by rain and snow the runoff, which initially appeared to be rather small, abruptly became quite sufficient to fill the potholes and produced the largest stream flow in the Wild Rice River in several years. Water began flowing out of Lake Tawaukon on April 6 and continued until August 1.

At the beginning of the year the water level on Lake Tawaukon was about six inches below spillway level. With flow from the Wild Rice River and other smaller streams the lake rapidly filled and a high reading for the year (1148.40) was reached on April 12. The water level has receded since that time with minor fluctuations due to rainfall.

The rubble masonry outlet structure on Lake Tawaukon was again undermined by water but the leak was effectively plugged until the new dam, located one-half mile further downstream, could be completed. The old dam was removed and water filled behind the new dam in November. The release of water to fill behind this increased the surface area of Lake Tawaukon by 100 acres and dropped the level of the lake less than three-tenths of a foot.

Outlets Marsh also filled rapidly with flow from the Wild Rice River and a high water level for the year (1150.62) was reached on April 12. As planned, the marsh was put into partial drawdown in mid-summer with drawdown as far as possible completed just prior to freeze-up. A complete drawdown is not possible as Lake Tawaukon controls the low marsh elevation, however, much of the water is less than one foot deep and it is hoped a complete winter kill of fish can be achieved.

White Lake filled rapidly with runoff both from Cutlers Marsh and the intermittent stream entering on the south and reached a high level of 1150.72 on April 12. The drawdown on Cutlers Marsh in turn effected a slight drawdown on White Lake until the connecting channel was higher than either area. Since that time the water level has receded slowly.

Clouds Lake, receiving runoff from the intermittent stream to the south, raised 3.5 feet between April 1 and April 12. Water was released from the lake after a high level of 1178.66 was attained to prevent water from overflowing the dike. Water was periodically released from Clouds Lake to fill downstream pools (3, 5, 6 and 7). Drawdown of the lake was initiated during November in an attempt to eliminate the few fish that might remain after the lake was treated with rotenone in August.

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With the completion of the Tewauckon Watershed dam, T-1A, and its channel into Sprague Lake, the larger runoff this spring indicated what we can expect in future years. In less than eight days (April 5-12) the water level in Sprague Lake rose four feet prompting S.C.S. engineers to check to see how much private land not covered by flooding easement might be flooded if the lake level continued to rise.

The rapidly flowing water in the channel brought with it an unknown, but large quantity of silt, most of it deposited in the lake. Three culverts under the township road were just able to pass the water from the lake into the Wild Rice River and permitted a large number of carp to move into the lake. Between the additional carp, siltation and uprooting of emergent vegetation by the rapidly rising water, the benefit to waterfowl of increased water level is virtually nullified.

Probably the greatest benefit derived from the increased water levels is that with shallow ditches, water was passed to a 5.6 acre marsh and a 16.5 acre marsh located south and west of the lake, respectively. Fish screens were set up on the ditches to restrict carp. Waterfowl use of both of these marshes was very good.

Main Lake, because of its direct connection to the Wild Rice River fluctuates rather widely and at the peak of the runoff flooded considerable land to the west and at one point came within six inches of the township road. As the river receded the lake correspondingly dropped and has receded gradually during the remainder of the year.

The development of an outlet structure on Clouds Lake has permitted a variety of management on the small pools downstream from the lake. Pool #3 was farmed during the summer and reflooded during the fall migration. Pool #5 was filled to overflowing with the spring runoff and shortly after runoff was completed a hole was made in the dike and a stoplog structure was installed. The pool was then maintained at maximum level throughout the summer and fall and was put into drawdown in November. Pool #6 was maintained at or near maximum level during summer and fall, with the exception of a brief drawdown in May. During November it was also put into drawdown.

Pool #7 was farmed during the summer and a new culvert and control were placed in the outlet. In October it was flooded and remained flooded at freeze-up. Pool #9 was maintained by runoff and rainfall and no releases were necessary from Clouds Lake.

The potholes, which are the backbone of waterfowl production recovered nicely with the spring runoff and were in excellent condition during the year. The shallow, less permanent potholes began drying up in mid-summer but above normal rainfall kept many wet through September.

Food Supplies

Noticeable submergent aquatic vegetation was missing from all major lakes and impoundments. Carp are thought to be at least partially responsible for the continued reduction in aquatic food.

The small, carp free impoundments #5, #6, #9 and the show pool had excellent stands of submergents and received good summer and fall use by ducks.

Potholes again provided a good supply of food with stands of Polygonum spp. noted in some areas. The deeper marshes received good waterfowl use during the year.

Millet, grown in pools #3 and #7 produced above average yields and when flooded during the fall proved very attractive.

Waterfowl Use

The late break up of refuge lakes reduced spring waterfowl use considerably below that in 1964. Most of the spring use was on areas flooded by the large runoff to the south of the refuge.

Ducks found ideal breeding conditions throughout the area. Production was only mediocre but brood use of the newly created impoundments was most encouraging. Twenty-one broods were recorded on pools #5 and #6 during the summer with the bulk of the observations made on pool #5. Blue-winged teal, mallard, pintail, canvasback, redhead, shoveler and gadwall broods were recorded and over 100 local blue-winged teal were banded on pool #5. With the exception of Mann and White lakes, all water areas received good waterfowl use during the fall.

Fall geese use on Lake Tewaukon increased slightly over a year ago and on the weekend of October 9 between 25 and 30 thousand puddle ducks were on the lake. Mallards kept water open on the east end of the lake until the third week of November when cold weather forced the birds south.

Cutlers Marsh, even in a drawdown, was utilized heavily by waterfowl and was the major overnight roosting area for geese. When flooded the millet in pools #3a and #7 attracted large numbers of both mallards and geese. Sprague Lake and the 5.6 acre marsh to the south received heavy use by mallards that fed in the surrounding croplands.

1966 Water Use Program

White, Sprague and Mann Lakes will be held at the maximum levels as determined by runoff, rainfall and in the latter by flow from the Wild Rice River.

The drainage area of the intermittent stream that flows into White Lake has been reduced considerably by the construction of dam, T-2, in the Tewaukon Watershed project. Although flow will be reduced, enough water should reach the lake to maintain it at a reasonable level.

The increased flows, as a result of watershed development, into Sprague Lake are of dubious value, however, the utilization of some of this water in the marshes south and west of the lake has increased waterfowl usage of the area. The south marsh will be maintained at about the same level as in 1965. The west marsh will receive, through ditches and possibly pumping, an additional three feet of water to eliminate vegetation that now chokes the marsh. Measures will be taken so that carp do not invade these areas.

Lake Tewaukon will be held at approximately 1147.00 even though the new structure is designed for 1149.00.

There is urgent need to riprap the county road and bridge on the west end of the lake and below the future headquarters site before the water is held at a higher level. This essential ripraping will be done this summer if additional equipment becomes available. Protection of the shoreline on the remainder of the lake is logistically impossible at this time and erosion, when the lake level is raised, will be great in many places.

The construction of a new control structure for Cutler Marsh, below the present site, will probably be facilitated with the lake at a lower level. There may be some individuals that will protest the lake not being raised immediately but completion of the above projects is essential before the lake level is increased.

Tewaukon
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Cutler Marsh will be held at spillway level during the spring to prevent a movement of carp from Lake Tewaukon into the marsh. Prior to the construction of the new structure water will be released from the marsh to facilitate construction of level ditches, nesting islands, etc., in the drier areas. It will remain in a drawdown state through the winter in a further attempt to reduce the carp population.

Glads Lake will be held at a level not to exceed 1178.00 as determined by runoff and rainfall. A higher lake level is not desirable as erosion of the banks is of greater detriment than the value of the additional water. Water will be released periodically to fill and maintain pools #5, #6 and #9 throughout the year and in the fall to pool #7 and #3.

The completion of T-2 will divert water that previously flowed into White Lake into Clouds Lake. The channel leading from T-2 to the lake has not yet been completed. Unless we get a large volume of runoff, enough to fill the 14 foot deep permanent pool on T-2, we anticipate little flow.

Water in pool #7 will be released in the spring to fill pool #5 and, if conditions permit, farmed during the summer and reflooded during October.

Pool #3a will also be farmed and flooded in the fall.

Pools #5, #6 and #9 will be held at maximum levels during the year.

As additional water management tools are developed it will become more important to evaluate the effectiveness of the various tools in achieving the refuge objectives. In 1965 vegetative transects were set up on all of the permanent water areas over which we have at least some control of the water to monitor yearly changes in aquatic vegetation. These transects will be continued in 1966 and additional waterfowl observations (especially pair and brood use) will be made on the carp free water areas (pools 5-9 and marshes south and west of Sprague Lake) to relate vegetative changes to waterfowl use.